

## CLAIMS

1. An information record medium on which  
reproduction control information including channel  
5 assignment information in which each bit position in a bit  
arrangement made of a plurality of bits is assigned to each channel  
corresponding to each speaker position in a speaker arrangement  
made of a plurality of speakers, so that each bit value indicates  
whether or not audio data for each channel corresponding to each  
10 bit exists, and  
a plurality of audio data whose existence is indicated by the  
channel assignment information and recorded for each channel are  
recorded.
- 15 2. The information record medium according to claim 1, wherein  
the channel assignment information comprises a channel  
assignment table in which the speaker arrangement is associated  
with the bit arrangement.
- 20 3. The information record medium according to claim 1, wherein  
the plurality of audio data is packed or packetized, and arranged in  
a sequence corresponding to an arrangement sequence of the  
plurality of bits by one or more sample units in each pack or each  
packet.
- 25 4. The information record medium according to claim 1, wherein

a bit existing at a predetermined position in the bit arrangement indicates whether or not audio data for any channel not corresponding to a speaker position in the speaker arrangement exists.

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5. The information record medium according to claim 4, wherein the bit existing at the predetermined position is an LSB (Least Significant Bit) in the bit arrangement and indicates whether or not audio data for a super woofer channel exists.

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6. The information record medium according to claim 1, wherein the bit arrangement is made of a plurality of bits arranged two dimensionally with a predetermined number of bits for each row over a predetermined number of rows,

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the speaker arrangement is made of a plurality of speakers arranged on a plane corresponding to the two dimensional arrangement of the plurality of bits.

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7. The information record medium according to claim 1, wherein the speaker arrangement is made of a plurality of speakers arranged three dimensionally,

the bit arrangement includes a plurality of partial bit arrangements,

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each of the plurality of partial bit arrangements is made of a plurality of bits arranged two dimensionally with a predetermined number of bits for each row over a predetermined number of rows,

each partial bit arrangement being associated with a plurality of channels corresponding to a plurality of speakers arranged on a plane of the same height for each concerned partial bit arrangement, from among the plurality of speakers arranged three dimensionally,

5           the plurality of partial bit arrangements exist as many as the number of the planes.

8.       The information record medium according to claim 7, wherein the reproduction control information further includes total channel  
10   number information to indicate a total channel number, layer information to indicate a total number of planes having different heights from each other allowing a three dimensional arrangement of speakers, and layer constitution information to indicate whether or not at least one speaker is disposed on each plane.

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9.       The information record medium according to claim 6, wherein at least one of the predetermined number of bits or the predetermined number of rows is variable.

20   10.    An information record apparatus comprising:  
          a generating device for generating reproduction control information including channel assignment information in which each bit position in a bit arrangement made of a plurality of bits is assigned to each channel corresponding to each speaker position in  
25   a speaker arrangement made of a plurality of speakers, so that each bit value indicates whether or not audio data for each channel

corresponding to each bit exists;

a first recording device for recording the generated reproduction control information into a control information area on an information record medium; and

5 a second recording device for recording a plurality of audio data whose existence is indicated by the channel assignment information into a data area on the information record medium for each channel.

10 11. The information record apparatus according to claim 10, wherein the channel assignment information comprises a channel assignment table in which the speaker arrangement is associated with the bit arrangement.

15 12. The information record apparatus according to claim 10, wherein the plurality of audio data is packed or packetized, and arranged in a sequence corresponding to an arrangement sequence of the plurality of bits by one or more sample units in each pack or each packet.

20 13. The information record apparatus according to claim 10, wherein a bit existing at a predetermined position in the bit arrangement indicates whether or not audio data for any channel not corresponding to a speaker position in the speaker arrangement  
25 exists.

14. The information record apparatus according to claim 13, wherein the bit existing at the predetermined position is an LSB (Least Significant Bit) in the bit arrangement and indicates whether or not audio data for a super woofer channel exists.

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15. The information record apparatus according to claim 10, wherein

the bit arrangement is made of a plurality of bits arranged two dimensionally with a predetermined number of bits for each row  
10 over a predetermined number of rows,

the speaker arrangement is made of a plurality of speakers arranged on a plane corresponding to the two dimensional arrangement of the plurality of bits.

15 16. The information record apparatus according to claim 10, wherein

the speaker arrangement is made of a plurality of speakers arranged three dimensionally,

the bit arrangement includes a plurality of partial bit  
20 arrangements,

each of the plurality of partial bit arrangements is made of a plurality of bits arranged two dimensionally with a predetermined number of bits for each row over a predetermined number of rows, each partial bit arrangement being associated with a plurality of  
25 channels corresponding to a plurality of speakers arranged on a plane of the same height for each concerned partial bit arrangement,

from among the plurality of speakers arranged three dimensionally,  
the plurality of partial bit arrangements exists as many as  
the number of the planes.

5 17. The information record apparatus according to claim 16,  
wherein the reproduction control information further includes total  
channel number information to indicate a total channel number,  
layer information to indicate a total number of planes having  
different heights from each other allowing a three dimensional  
10 arrangement of speakers, and layer constitution information to  
indicate whether or not at least one speaker is disposed on each  
plane.

18. The information record apparatus according to claim 15,  
15 wherein at least one of the predetermined number of bits or the  
predetermined number of rows is variable.

19. An information record method comprising:  
a generating process of generating reproduction control  
20 information including channel assignment information in which  
each bit position in a bit arrangement made of a plurality of bits is  
assigned to each channel corresponding to each speaker position in  
a speaker arrangement made of a plurality of speakers, so that each  
bit value indicates whether or not audio data for each channel  
25 corresponding to each bit exists;

a first recording process of recording the generated

reproduction control information into a control information area on an information record medium; and

5 a second recording process of recording a plurality of audio data whose existence is indicated by the channel assignment information into a data area on the information record medium for each channel.

20. An information reproduction apparatus for reproducing the plurality of audio data from the information record medium according to claim 1, said information reproduction apparatus comprising:

a reading device for reading the plurality of audio data and the reproduction control information from the information record medium;

15 an identifying device for identifying channels of the plurality of audio data recorded in the information record medium, on the basis of each bit position in the bit arrangement relating to the channel assignment information included in the read reproduction control information; and

20 a reproducing device for reproducing the plurality of read audio data as a plurality of audio data for the identified each channel.

21. An information reproduction method of reproducing the plurality of audio data from the information record medium according to claim 1, said information reproduction method

comprising:

a reading process of reading the plurality of audio data and the reproduction control information from the information record medium;

5            an identifying process of identifying channels of the plurality of audio data recorded in the information record medium, on the basis of each bit position in the bit arrangement relating to the channel assignment information included in the read reproduction control information; and

10           a reproducing process of reproducing the plurality of read audio data as a plurality of audio data for the identified each channel.

22.    An information record reproduction apparatus comprising:

15           a generating device for generating reproduction control information including channel assignment information in which each bit position in a bit arrangement made of a plurality of bits is assigned to each channel corresponding to each speaker position in a speaker arrangement made of a plurality of speakers, so that each  
20    bit value indicates whether or not audio data for each channel corresponding to each bit exists;

a first recording device for recording the generated reproduction control information into a control information area on an information record medium;

25           a second recording device for recording a plurality of audio data whose existence is indicated by the channel assignment



information into a data area on the information record medium for each channel;

5 a reading device for reading the plurality of audio data and the reproduction control information from the information record medium;

an identifying device for identifying channels of the plurality of audio data recorded in the information record medium, on the basis of each bit position in the bit arrangement relating to the channel assignment information included in the read reproduction control information; and

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a reproducing device for reproducing the plurality of read audio data as a plurality of audio data for the identified each channel.

15 23. An information record reproduction method comprising:

a generating process of generating reproduction control information including channel assignment information in which each bit position in a bit arrangement made of a plurality of bits is assigned to each channel corresponding to each speaker position in a speaker arrangement made of a plurality of speakers, so that each bit value indicates whether or not audio data for each channel corresponding to each bit exists;

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a first recording process of recording the generated reproduction control information into a control information area on an information record medium;

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a second recording process of recording a plurality of audio

data whose existence is indicated by the channel assignment information into a data area on the information record medium for each channel;

5 a reading process of reading the plurality of audio data and the reproduction control information from the information record medium;

an identifying process of identifying channels of the plurality of audio data recorded in the information record medium, on the basis of each bit position in the bit arrangement relating to the channel assignment information included in the read reproduction information; and

a reproducing process of reproducing the plurality of read audio data as a plurality of audio data for the identified each channel.

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24. A computer program for a recording control to control a computer provided for the information record apparatus according to claim 10, and to make the computer function as at least part of the generating device, the first recording device and the second recording device.

25. A computer program for a reproduction control to control a computer provided for the information reproduction apparatus according to claim 20, and to make the computer function as at least part of the reading device, the identifying device and the reproducing device.

26. A computer program for a recording and reproduction control to control a computer provided for the information record reproduction apparatus according to claim 22, and to make the  
5 computer function as at least part of the generating device, the first recording device, the second recording device, the reading device, the identifying device and the reproducing device.

27. A data structure including a control signal, said structure  
10 comprising:

reproduction control information including channel assignment information in which each bit position in a bit arrangement made of a plurality of bits is assigned to each channel corresponding to each speaker position in a speaker arrangement  
15 made of a plurality of speakers, so that each bit value indicates whether or not audio data for each channel corresponding to each bit exists, and

a plurality of audio data whose existence is indicated by the channel assignment information and recorded for each channel.